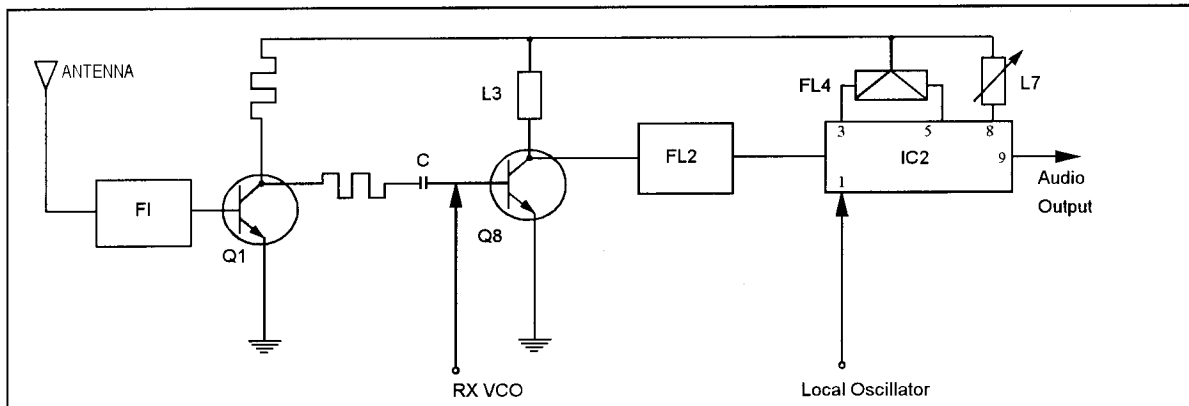# CIRCUIT DESCRIPTION

1. HANDSET

1.1 RECEPTION

Figure 1

As shown in figure 1, the received signal from the base unit passes through 927 MHz Filter and amplified by RF Amplifier (Q8). The amplified input signal is mixed with RX VCO (Q11, Q7, L6, D1) signal.

The VCO oscillation is controlled by error signals from PLL IC3 pin no. 10. The channel information to PLL IC is provided by Microprocessor IC (IC100) pin nos. 11,12 and 13. (Serial data outputs).

The Mixer output from Q9 passes through 10.7 MHz Ceramic Filter (F3) and enters to FM Demodulator IC1 pin no. 16. This signal mixes with 11.15 MHz signal from PLL IC3 pin no. 11, which is connected to IC1 pin no.1. The mixed signal is filtered by 450 KHz Filter (F4).
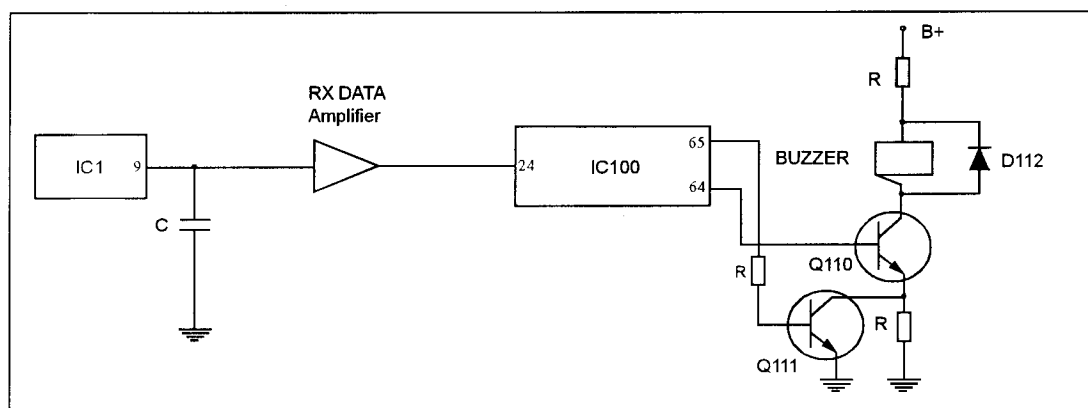
1.2 RINGER OUTPUT

Figure 2

After detection of ring signal, the base unit will transmit the data code signal including security code to handset.

As shown in figure 2, the demodulated ring signal from pin no. 9 of FM Demodulator IC1 is fed to low pass filter and amplified by RX Data Amplifier and its output is connected to RX Data port of Microprocessor IC (IC100).

The ring signal output from pin no. 65,64 of Microprocessor IC (IC100) goes to buzzer driver Q110 and Q111 to activate the buzzer.
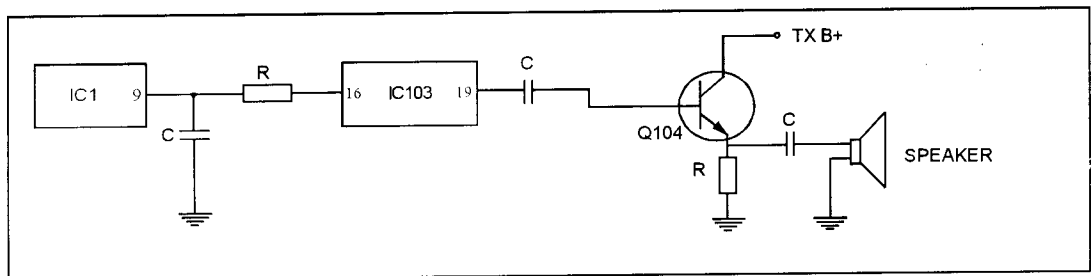
1.3 VOICE OUTPUT

Figure 3

The demodulated signal, resulting from Double Super Heterodyne system, which appears at output pin no. 9 of IC1 is connected to pin no. 16 Expander input of Compander IC (IC103) for expansion. The expanded audio output from IC103 pin no. 19 is finally amplified by Q104 and A.C. coupled to the receiver unit with Hearing Aid Compatibility (HAC).
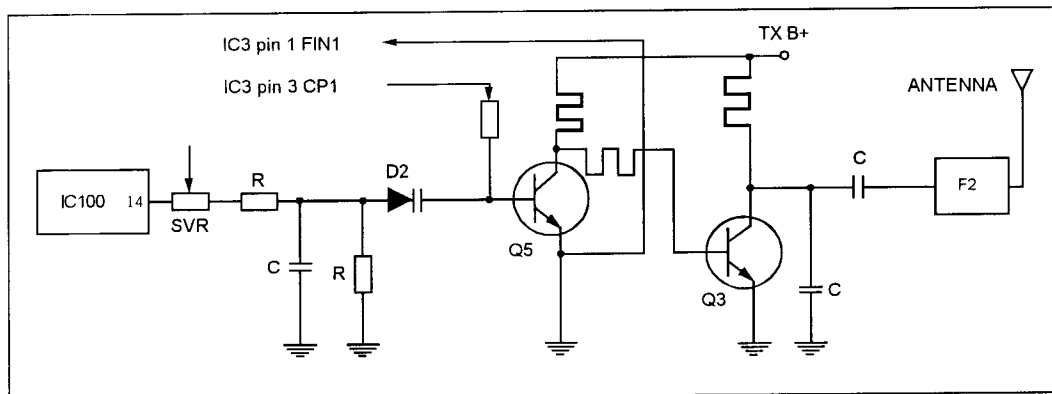
1.4 DATA TRANSMISSION

Figure 4

As shown in figure 4, the TX data code output including security code from IC1 pin no. 14 is connected to TX VCO for modulation. The data code signal is modulated with the carrier frequency generated by the RFoscillator (Q5). The oscillator frequency is controlled by the error signal from pin no.3 of PLL IC (IC3). The modulated signal is amplified by RF amplifier stage (Q3) and then passes through 927MHz filter stage (F2). The FM modulated signal is radiated by the handset Rubberized Antenna.

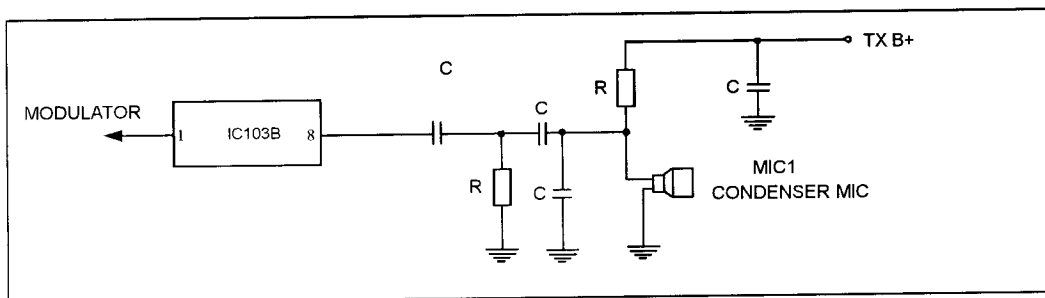## 1.5   VOICE TRANSMISSION

Figure 5

Voice signal from condenser mic is coupled to pin no. 8 of Compander IC (IC103B). The voice signal is compressed by IC103B and then connected to TX VCO stage for modulation.

1.6   RECEIVER POWER CONTROL

· When at STANDBY mode and RING ON mode the handset has 50 ms power on and 800ms power off on receiver section.

· When at STANDBY mode and SAVE ON mode, the handset have no power on receiver section.

· The power saving is controlled by Microprocessor IC (IC100) pin no. 27 (RX power control) and Q100.

1.7   TRANSMITTER POWER CONTROL

· When at TALK mode, the handset transmitter should be working.

· The transmitter power is controlled by Microprocessor IC (IC100) pin no. 28 (TX power control) and Q101.

1.8 BATTERY LOW DETECTOR

- When the battery voltage goes down until 3.3 to 0.1 Vdc, the LED1 will flash with warning sound "Bi, Bi".
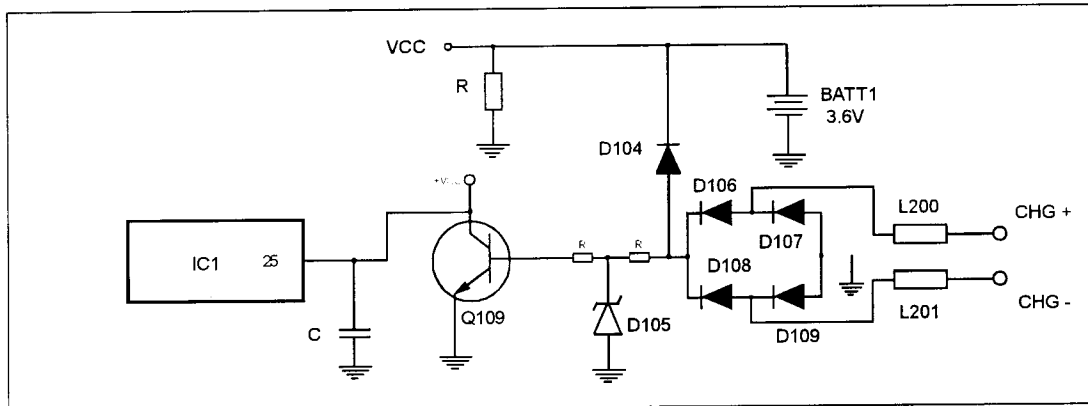
1.9 BATTERY CHARGING

Figure 6

- When the handset is placed on the base unit cradle, the battery will be charging and will be detected by Microprocessor IC (IC100) pin no.25.
- Microprocessor IC will exchange security code randomly.
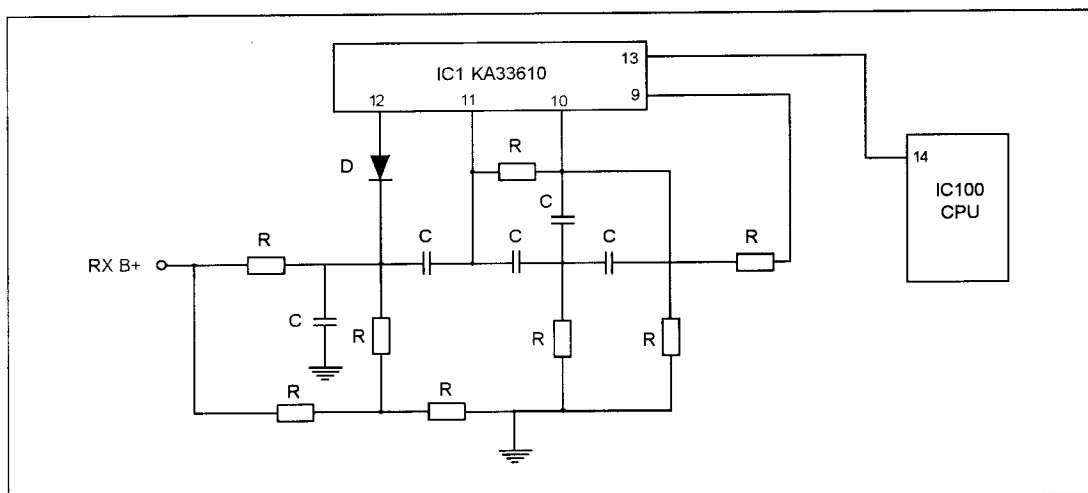
1.10 SQUELCH

Figure 7

As shown in figure 7, the audio output (noise output) from FM Demodulator IC (IC1) pin no.9 goes to pin no. 10 (Noise filter input) and the output from pin no. 11 will enter to pin no. 12 to activate the squelch control of IC1. The output from pin no. 11 is connected to the Microprocessor IC (IC100) for RSSI Detection.

NOTE :
- When the handset is far away from the base unit, squelch circuit of IC1 operates and pin no. 13 of IC1 goes 'HI'. This will be detected by Microprocessor and after 10 seconds, it goes to standby mode.

2. BASE UNIT

2.1 RECEPTION

Base receiver circuit is similar to handset receiver circuit description as shown in figure 1. The difference with section 1.1 are local frequency and receiving frequency as descibe below.

The received signal from the handset unit passes through 927 MHz filter and amplified by RF RF Amplifier (Q8). The amplified signal is mixed with RX VCO (Q11, Q7, L6, D1).

The mixer output from Q9 passes through 10.7 MHz filter and enters to FM Demodulator IC (IC1) pin no. 16. This signal is mixed with 11.15 MHz signal from PLL IC (IC3) pin no.9, which is connected to IC1 pin no. 1. The mixed signal is filtered by 450 KHz Filter (F4).

2.2 DATA INPUT

The demodulated data code from FM Demodulator IC (IC1) pin no. 9 is fed to Lowpass filter and its output is connected to code input of Microprocessor IC (IC200).

2.3 AUDIO OUTPUT

As shown in figure 8, the demodulated signal which appears at output pin of FM Demodulator IC (IC1) pin no. 9 is sent through lowpass filter to Compander IC (IC100A) pin no. 16 (Expander input) for expansion. The expanded audio signal output from IC100A pin no. 19 is coupled to Buffer Amplifier (Q202,Q201) during the CONVERSATION mode. The audio is sent to telephone line via Hybrid X'former (HYB1).
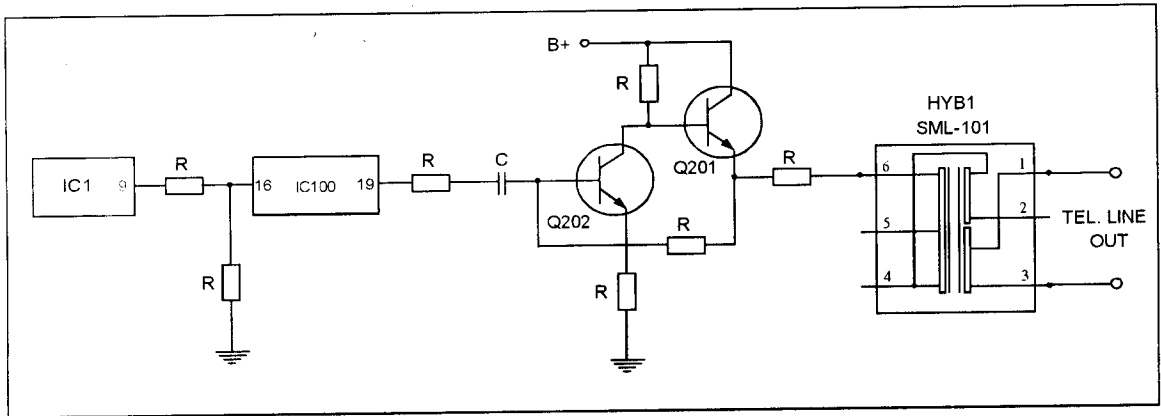
Figure 8

2.4 DATA TRANSMISSION

Refer to figure 4., the difference is that the TX Data is transmitted from pin 10 of Microprocessor IC (IC200).
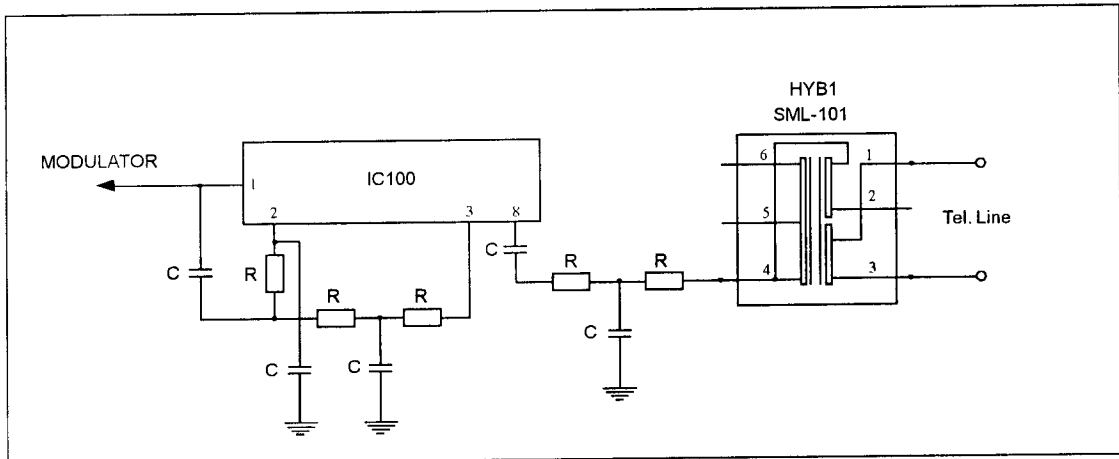
2.5 VOICE TRANSMISSION

Figure 9

The audio signal receiving from telephone line is input to Compander IC (IC100B) pin no. 8 for compression. The compressed audio signal from pin no.1of IC100B is connected to TX VCO for modulation. The signal is modulated with the carrier frequency of the oscillator (Q5), the oscillator frequency is controlled by the error signal from pin 3 of PLL IC. The modulated signal is amplified by RF Amplifier stage (Q3) and then passes through 903 MHz filter stage (F2). The FM modulated signal is radiated by the base unit antenna.
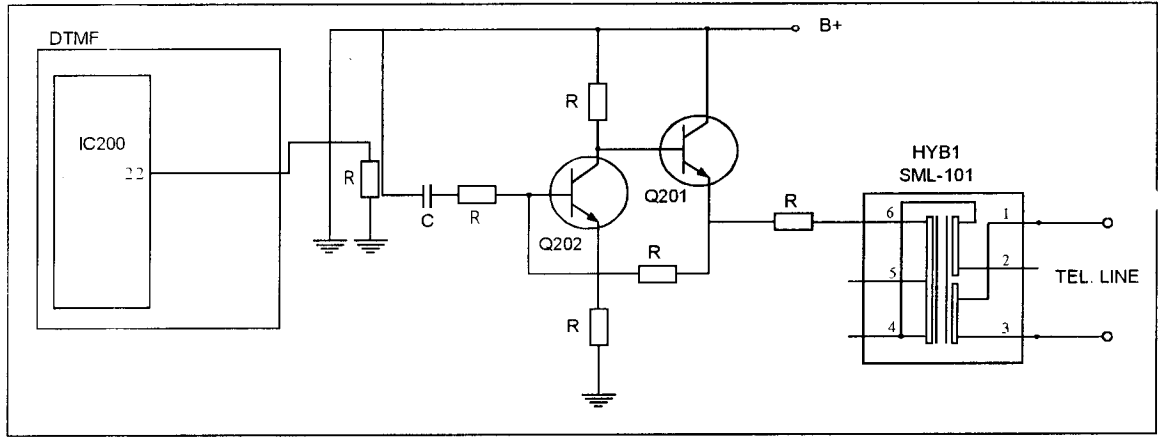
2.6 DTMF OUT

Figure 10

DTMF dialing is generated in pin no. 22 of Microprocessor IC (IC200) .

2.7 TRANSMITTER POWER CONTROL

Transmit power is controlled by IC200 pin 5 and Q100 .

2.8 RINGER DETECT

Figure 11
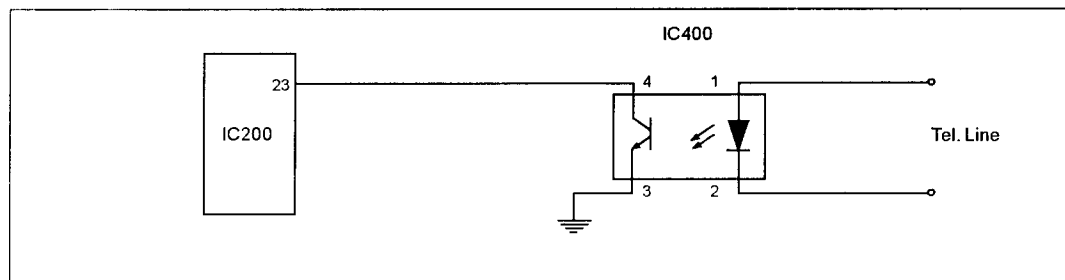
The ring signal from the telephone line is detected by Photocoupler (IC400) and the output from IC400 will be coupled to Microprocessor IC (IC200) pin no. 23. After detection of ring signal,the microprocessor will send the data code to handset.

2.9 PULSE DIAL

During pulse dialing, IC200 CPU pin 224 will be sending pulse dial signal to Relay trigger (Q203) then goes to telephone line.

2.10 CHARGE DETECT
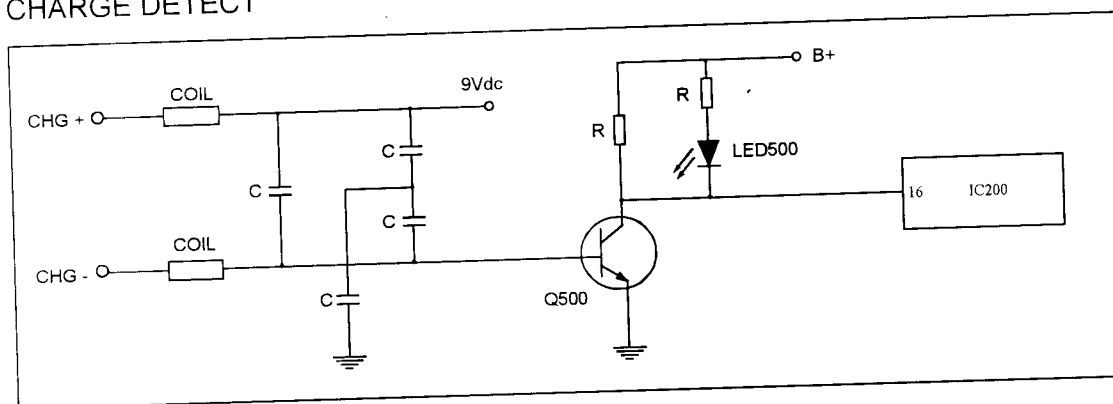
Figure 12

When the handset is on cradle, Q500 is activated and Microprocessor IC (IC200) pin 16 will detect the charging then it will exhange security code randomly.

2.11 SQUELCH

Refer to section 1.10. Squelch operation is same as handset as shown in figure 7.

2.12 PAGE FUNCTION

The Microprocessor IC (IC200) will detect page signal when IC200 pin no. 17 goes low (press SW500), IC200 will transmit paging signal from pin no. 10 (TX Data port).

2.13 RESET

When handset is place on cradle (charge) or insert the power plug into the socket, Base will reset automatically.

40 CHANNEL - AUTOMATIC CHANNEL SELECTION MECHANISM
MODEL: MH9917

During the activation of Talk, the Handset receiver scans for free channel from its last linked receiver channel (about 50ms per channel). Once a free channel is found, the Handset transmits the Talk instruction to Base together with the receiver's free channel information for the Base to use this free channel as the Transmit channel.

Likewise, the Base receiver continuously scans each channel (25ms per channel) and stores all free channels into its memory. Once the Base receiver received the instruction from its Handset, it will stop from scanning and transmits its acknowledgement data with the Base receiver free channel information. When the Handset receives this Base free channel information, it will transmit the link command to Base and both will link on the clearest channel. The Handset and Base scan and find their receiver's clearest channel separately. If all transmit channels of Handset and Base are occupied (all busy), Handset and Base will link on the default channel (Channel 20).

	BASE		HANDSET			BASE		HANDSET	
C H	T X	R X	T X	R X	C H	T X	R X	T X	R X
1	902.200	926.200	926.200	902.200	21	903.000	927.000	927.000	903.000
2	902.240	926.240	926.240	902.240	22	903.040	927.040	927.040	903.040
3	902.280	926.280	926.280	902.280	23	903.080	927.080	927.080	903.080
4	902.320	926.320	926.320	902.320	24	903.120	927.120	927.120	903.120
5	902.360	926.360	926.360	902.360	25	903.160	927.160	927.160	903.160
6	902.400	926.400	926.400	902.400	26	903.200	927.200	927.200	903.200
7	902.440	926.440	926.440	902.440	27	903.240	927.240	927.240	903.240
8	902.480	926.480	926.480	902.480	28	903.280	927.280	927.280	903.280
9	902.520	926.520	926.520	902.520	29	903.320	927.320	927.320	903.320
10	902.560	926.560	926.560	902.560	30	903.360	927.360	927.360	903.360
11	902.600	926.600	926.600	902.600	31	903.400	927.400	927.400	903.400
12	902.640	926.640	926.640	902.640	32	903.440	927.440	927.440	903.440
13	902.680	926.680	926.680	902.680	33	903.480	927.480	927.480	903.480
14	902.720	926.720	926.720	902.720	34	903.520	927.520	927.520	903.520
15	902.760	926.760	926.760	902.760	35	903.560	927.560	927.560	903.560
16	902.800	926.800	926.800	902.800	36	903.600	927.600	927.600	903.600
17	902.840	926.840	926.840	902.840	37	903.640	927.640	927.640	903.640
18	902.880	926.880	926.880	902.880	38	903.680	927.680	927.680	903.680
19	902.920	926.920	926.920	902.920	39	903.720	927.720	927.720	903.720
20	902.960	926.960	926.960	902.960	40	903.760	927.760	927.760	903.760